What is claimed is:

1. A semiconductor device comprising:

a silicon substrate and

a metal-oxide-semiconductor field-effect transistor formed on said silicon substrate,

wherein a gate electrode of said transistor comprises a germanium film.

2. A semiconductor device according to claim 1, wherein said germanium film comprises any one of a single-crystalline germanium film, a polycrystalline germanium film or an amorphous germanium film.

3. A semiconductor device according to claim 1 or 2, wherein p-type impurities are doped into said germanium film.

4. A semiconductor device according to claim 1, wherein said gate electrode comprises a multi-layer structure that includes a low resistance conductive film.

5. A semiconductor device according to claim 4, wherein said low resistance conductive film comprises a transition metal, a transition metal silicide, or a transition metal nitride film, or a combination thereof.

6. A semiconductor device according to claim 4, wherein said multi-layer structure is provided with a polysilicon film in between said germanium film and said low resistance conductive film.

7. A semiconductor device comprising:

an n-channel metal-oxide-semiconductor field-effect transistor and

a p-channel metal-oxide-semiconductor field-effect transistor,

wherein a gate electrode of each of said transistors comprises any one of a single-crystalline germanium film, a polycrystalline germanium film or an amorphous germanium film in which p-type impurities are doped.

8. A manufacturing method of a semiconductor device comprising:

a step of forming a gate oxide on a semiconductor substrate;

a step of forming a germanium film on said gate oxide;

a step of doping p-type impurities into said germanium film and patterning said germanium film to form a gate electrode; and

a step of forming a source region and a drain region by using said gate electrode as a mask.

9. A manufacturing method of a semiconductor device according to claim 8, wherein the step of forming said gate electrode comprises:

a step of forming a polysilicon on said germanium film;

a step of forming a transition metal on said polysilicon film; and

a step of annealing said polysilicon so that a part or all of said polysilicon becomes a transition metal silicide.

10. A manufacturing method of a semiconductor device according to claim 8, wherein the step of forming said gate electrode includes a step of forming a metal transition film or a metal transition nitride film on said germanium film.

11. A manufacturing method of a semiconductor device according to claim 8, wherein said p-type impurities are doped by a CVD method.

12. A manufacturing method of a semiconductor device according to claim 8, wherein said p-type impurities are doped by an ion implantation method.

13. A manufacturing method of a semiconductor d vice comprising:

a step of forming a gate oxide on a substrate of a semiconductor substrate;

a step of forming a germanium film on said gate oxide;

a step of doping p-type impurities into said germanium film and patterning said germanium film to form a gate electrode;

a step of forming a source region and a drain region by using said gate electrode as a mask;

a step of forming a spacer on both ends of said gate electrode; and

a step of forming a transition metal film on said gate electrode and said source region and a drain region and annealing said transition metal film to form.